

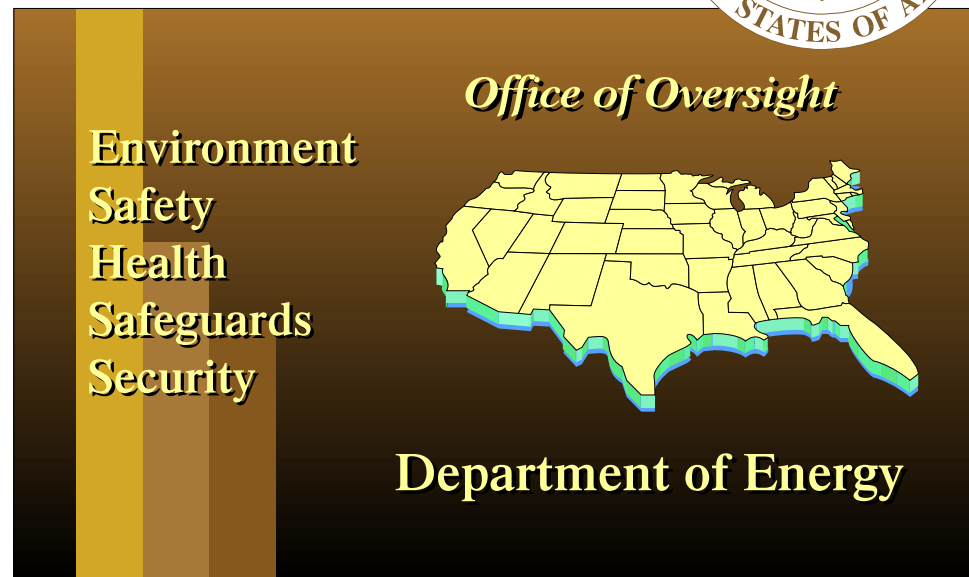
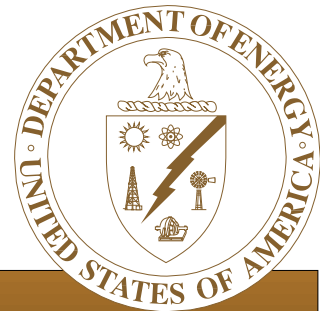
*Independent Oversight Review of*

# **Aviation Safety Programs**

**in the**

## **Department of Energy**

August 1997



Office of Environment, Safety and Health

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Abbreviations Used in This Report

AGL	Above Ground Level
AOT	Aviation Operations Team
DOE	U.S. Department of Energy
EH	DOE Office of Environment, Safety and Health
EH-2	EH Office of Oversight
EH-53	EH Office of Field Support
FAA	Federal Aviation Administration
NEST	Nuclear Emergency Search Team
SAMO	Senior Aviation Management Official
SNM	Special Nuclear Material
VFR	Visual Flight Rules

OVERSIGHT



# Executive Summary

## Scope

In September 1996 and April 1997, the U.S. Department of Energy (DOE) Office of Oversight evaluated the effectiveness of the agency's aviation safety program. The evaluation had two primary objectives:

1. Determine the long-term effectiveness of actions taken by the DOE to respond to a series of aviation accidents that occurred in the 1990-1992 timeframe.
2. Assess the impacts of recent changes in DOE's aviation program.

## Background

Although aviation is not widely recognized as one of DOE's activities, DOE owns a fleet of aircraft that is roughly equivalent to a U.S. regional airline. Even after the downsizing that has occurred over the past five years, DOE owns 31 aircraft, which are operated by DOE and by DOE's contractors or subcontractors. DOE also contracts with a number of private companies to provide aircraft and pilots (i.e., charters) on a regular basis.

DOE-owned or chartered aircraft are used for a variety of missions, ranging from routine helicopter patrols of electric power lines to providing the nation's capability to respond to radiological emergencies with the Nuclear Emergency Search Team. Some of the aviation activities performed by DOE involve unique hazards; for example, DOE transports radioactive isotopes by air for use in medical experiments, and uses helicopters to quickly respond to threats to special nuclear materials.

In the past, DOE and its contractors have not always effectively implemented their aviation safety responsibilities. Twelve aviation accidents in 1990-1992 resulted in 17 deaths, two serious injuries, and the destruction of seven aircraft. As a result, DOE issued new requirements governing aviation operations and established a Headquarters organization directly responsible for aviation safety. With these changes, DOE's safety record improved considerably. DOE aviation operations were accident-free from 1993 through the first quarter of 1997.

On April 23, 1997, DOE had its first accident since the implementation of its new aviation safety program: a Western Area Power Administration helicopter crashed in southern Colorado. The crash did not result in serious injury or loss of life, but the helicopter was destroyed. The investigation of the accident, conducted by Western Area Power Administration, concluded that:

- The accident could have been prevented.
- The pilot did not have adequate experience or training for the terrain and weather conditions.

## Results

Overall, DOE's aviation operations are being conducted in accordance with applicable requirements.

There are, however, a number of trends that, left unchecked, could lead to a degradation in the safety programs supporting DOE aviation operations.

## Performance at Field Locations

DOE contractors have developed appropriate maintenance, operations, and training procedures. Where required, these procedures have been approved and are inspected by the Federal Aviation Administration (FAA).

The pilots and personnel maintaining DOE aircraft are qualified, have extensive experience, and demonstrate a high level of professionalism.

Two areas of concern with regard to the field's management and implementation of aviation safety programs were identified:

1. The qualifications and experience of DOE personnel with aviation management responsibilities
2. The quality and depth of performance assessments.

While most aviation program managers generally have the proper experience and qualifications, the evaluation found that, in some cases, DOE personnel charged with aviation safety management responsibilities at the field offices were over-tasked and underqualified. DOE lost many experienced personnel to retirement, and in many cases, their replacements lack experience and qualifications. This problem is further compounded by lack of clear qualification standards and cutbacks in training.

The loss of DOE experience is compounded by ineffective assessments of contractor performance and, to a lesser extent, the contractor's own assessment of its performance (commonly referred to as a self-assessment). Weaknesses in this area diminish both the government's and the contractors' abilities to identify and correct problems before they result in unsafe conditions.

## Performance at Headquarters

The Office of Oversight identified three issues related to Headquarters policy and management systems that require senior management attention to resolve:

1. **Misperceptions about the scope of FAA regulation and inspections.** Throughout DOE, there is a common misperception that all aviation activities are subject to FAA regulation and inspections. Although FAA regulations technically regulate all aviation activity, the FAA only inspects some of the areas they regulate. The FAA's focus is primarily on passenger and cargo transport, while inspection of other DOE aviation activities, such as security response and electric power line patrols, is left to DOE. Regardless of which agency has inspection responsibility, it is a fundamental principle of DOE's safety management program that DOE and its contractor line management are responsible for ensuring that all of their aviation operations are conducted safely.
2. **Insufficient coordination between program offices and the Senior Aviation Management Official/Aviation Operations Team.** Although potentially effective, DOE's aviation safety management systems are not implemented consistently with the agency's guiding principles of safety management. Specifically, many of the Headquarters program offices are not sufficiently involved in the aviation safety program to effectively implement their line management responsibility for safety and to provide effective direction and support to the field.
3. **Appropriateness of the Bonneville Power Administration's exemption from DOE aviation safety requirements and oversight.** When Bonneville was designated a Reinvention Laboratory under the Vice President's National Performance Review, it was granted a broad exemption from DOE orders, including aviation safety orders and DOE oversight. In effect, Bonneville's aviation safety program has been separated from the rest of DOE. There are no effective provisions for DOE Headquarters to keep informed about the status of the Bonneville's aviation program or for ensuring a periodic review of the appropriateness of continued exemption.

## Conclusions

It is clear that the complex-wide requirements and Headquarters safety management program implemented after the 1990-1992 series of accidents have contributed to safer operations. While significant progress has been made, the evaluation raises concerns about the long-term sustainability of these results. The rapidly changing Federal workforce and diminishing resources, if not proactively managed, threaten the progress that has been made.

## Opportunities for Improvement

These opportunities are not prescriptive but may contribute to enhancements in the aviation safety program.

**1. Training and Qualifications:** Headquarters should establish minimum qualification standards for DOE field office personnel responsible for aviation safety management and assessments.

DOE field offices should ensure that field personnel meet these standards and ensure that assessments of contractors are comprehensive and emphasize areas not inspected by the FAA.

- 2. Coordination:** Program offices should become more involved with implementing their responsibilities by working in a partnership with the Senior Aviation Management Official. In this partnership, the program offices should use the Aviation Operations Team as a technical resource.
- 3. Accountability:** DOE management at all levels should reemphasize that DOE and DOE contractor line management are responsible for ensuring safe operations regardless of whether DOE or the FAA has inspection responsibility.
- 4. Exemption:** Senior DOE managers should periodically reevaluate the Bonneville Power Administration exemption.

To continue its 1996 review of Department of Energy (DOE) aviation safety, the DOE Office of Oversight conducted an evaluation of Department-wide aviation safety programs during April 1997. When combined, these two evaluations represent a major portion of DOE's aviation program.

The evaluation had two primary objectives:

1. Determine the long-term effectiveness of actions DOE has taken since it experienced a series of accidents in the 1990-1992 time frame that resulted in 17 fatalities and several serious injuries.
2. Assess DOE's aviation management systems and the impacts of recent changes to DOE's aviation order and a new law governing aviation programs.

As part of this evaluation, Oversight reviewed aviation safety policies, aviation safety management systems at Headquarters and field locations, and the implementation of aviation safety programs at most DOE sites. With the exception of the Bonneville Power Administration, this evaluation included reviews of all DOE field offices<sup>1</sup> that own or lease aircraft and selected DOE aviation operations that routinely charter aircraft.<sup>2</sup>

This report is intended primarily for senior DOE managers at Headquarters and field offices. It provides

<sup>1</sup> For simplicity, operations offices, project offices, and power administrations will be referred to as field offices in this report.

<sup>2</sup> Chartering aircraft refers to the practice of contracting private companies to perform specific aviation activities using their planes and pilots. In such cases, the companies providing charter services are regulated and inspected by the Federal Aviation Administration (FAA) provided that they have a Part 121 or Part 135 certificate. However, some of the specific flying activities may not be inspected by the FAA. DOE normally includes specific provisions in the contract requiring the company to comply with applicable FAA requirements and meet other applicable requirements.

an overall assessment and status of the DOE aviation safety program and identifies issues needing Headquarters' attention.

The evaluation was conducted in two phases. In the first phase, which was completed in September 1996, Oversight reviewed the aviation program management at Headquarters and implementation of aviation programs at three field offices. The results of the first phase, which are documented in an October 1996 report, identified issues that required attention, including weaknesses in technical qualification programs for DOE field personnel, ineffective DOE assessments and contractor self-assessments, and insufficient Headquarters program office involvement in aviation safety. Consequently, Oversight decided to expand the scope of the evaluation to include additional field offices and to further evaluate issues identified in the first review. In this second phase, Oversight reviewed four additional field offices that operate DOE-owned aircraft and reviewed selected charter operations.

Following this introductory section, Section 2 provides a brief history and scope of DOE's aviation program. Sections 3, 4, and 5, present results that have been divided into the following categories:

- Headquarters program management
- Requirements and regulation
- Field implementation.

The overall conclusions and potential opportunities for improvement are presented in Section 6.

The report includes two attachments. Attachment A summarizes the available information on the April 23, 1997, accident involving a Western Area Power Administration (Western) helicopter. Attachment B provides the details of the Oversight review and identifies the review team members.

# Overview of the DOE Aviation Safety Program

## Historical Perspectives

Aircraft have been an important tool for DOE and its predecessor organizations since the early days of the Manhattan Project. Aircraft were often used to rapidly transport materials and personnel between remote locations not serviced by commercial flights. As DOE's missions have expanded throughout the years, so has the agency's use of aircraft. By 1990, DOE had a fleet of over 50 aircraft performing a wide variety of activities.

Currently, DOE aviation supports its own missions as well as those of other national, state, and local government organizations, e.g.:

- Emergency rescue operations
- Evacuation of inaccessible areas due to natural disasters
- Electrical power line and pipeline patrol
- Transporting radioactive isotopes for use in medical experiments
- Environmental and wildlife monitoring and surveillance
- Rapid deployment of security forces to protect special nuclear material
- Rapid deployment of people and equipment required to respond to radiological emergencies with the Nuclear Emergency Search Team (NEST).

## Events Shaping DOE's Current Approach to Aviation

Until the early 1990s, DOE Headquarters' involvement in the aviation safety program was relatively limited. The decisions to operate aircraft were largely made at the field level based on their assessment of the benefits, risks, and costs. Then, from 1990 through 1992, DOE experienced 12 aviation accidents that resulted in 17 fatalities, two serious injuries, and the destruction of seven aircraft. Information about these accidents is shown in Table 1.

The investigations of these accidents identified several serious weaknesses in DOE's aviation program. The most significant concerns were:

- Many of the DOE personnel managing aviation operations were not qualified to do so.
- No mechanism existed to raise aviation safety problems to senior DOE management. Consequently, Headquarters and field managers had little knowledge of any problems and did not actively manage aviation safety.
- Aviation safety was not given high enough priority within DOE.



**Table 1. DOE Aircraft Accident/Incident History (1990-1992)**

Date	Aircraft Type	Field Office	Aircraft Owner	Description	Aircraft Damage	Injuries
2/12/90	Helicopter	Western <sup>1</sup>	DOE	In-flight collision with wires	Destroyed	2 Serious
5/8/90	Helicopter	Western	DOE	Hard landing (crash)	Destroyed	1 Minor
5/90*	Helicopter	NV <sup>2</sup>	DOE	Hard landing	Major	0
3/12/91	Helicopter	SR <sup>3</sup>	DOE	Hard landing	Minor	0
7/24/91	Helicopter	NV	DOE	In-flight collision with wires	Destroyed	5 Fatal
10/1/91	Fixed Wing	AL <sup>4</sup>	DOE	Loss of control on landing	Destroyed	0
12/10/91	Helicopter	SPRO <sup>5</sup>	Charter	In-flight collision with wires	Minor	0
6/3/92	Fixed Wing	RL <sup>6</sup>	Charter	Stall/spin	Destroyed	3 Fatal
6/18/92	Helicopters	AL	Charter	Midair collision	Minor	0
8/12/92	Helicopter	Western	Charter	In-flight collision with transmission tower	Destroyed	1 Fatal
12/18/92	Fixed Wing	Western	DOE	Wake turbulence	Destroyed	8 Fatal
12/18/92	Fixed Wing	Western	Charter	Aircraft ran off runway during takeoff	None	0

\*Damage discovered after occurrence. Exact date unknown.

<sup>1</sup> Western - Western Area Power Administration

<sup>2</sup> NV - DOE Nevada Operations Office

<sup>3</sup> SR - DOE Savannah River Operations Office

<sup>4</sup> AL - DOE Albuquerque Operations Office

<sup>5</sup> SPRO - Strategic Petroleum Reserve Office

<sup>6</sup> RL - DOE Richland Operations Office

The series of accidents prompted DOE to commission two special studies.

**Task Group on the Department of Energy Aviation Program:** Comprehensive review of the DOE aviation program, completed in February 1993.

**Conclusion:** DOE did not have an effective mechanism to define aviation safety policy and enforce consistently effective approaches at the various field locations.

**Recommendation:** Establish a Headquarters-based, centralized management approach.

**Department of Transportation:** Review of DOE's safety appraisal process, completed in February 1995.

**Conclusion:** The appraisal process lacked rigor and definition, and did not provide enough assistance to the field.

**Recommendation:** DOT made over 40 recommendations to improve the appraisal process, including the following:

- Develop formal program documentation, more detailed aviation standards, and systems-oriented appraisal guidelines and techniques.
- Clarify Headquarters relationships and functions.

- Acquire the resources necessary to implement the appraisal system effectively.

## Implementing a New Aviation Safety Program

The results of these accidents and the subsequent studies caused significant changes in DOE's aviation program. Most notably:

**DOE Order 5480.13A** - This order, issued in February 1993, prescribed in detail how aviation programs were to be organized and managed. The order also clearly delineated the required qualifications for aviation personnel.

**Organizational Improvements** - DOE established and staffed aviation safety functions at DOE Headquarters.

- The Office of Environment, Safety and Health (EH) was assigned responsibility for establishing aviation policy, providing technical assistance to the field elements, and assessing the effectiveness of aviation operations through onsite field visits.



- An Aviation Management Board was established to recommend and review broad elements of aviation policy for the agency.
- A requirement that each site submit an Aviation Implementation Plan for achieving and maintaining compliance with DOE orders was established.

This management structure evolved in subsequent years: independent oversight moved to the Office of Oversight (EH-2), all other EH aviation personnel moved to the Office of Field Support (EH-53), the EH-53 Director assumed the duties of the Senior Aviation Management Official (addressed in Section 3) and responsibility for aviation property management, and the Aviation Operations Team and the Aviation Board of Directors were established.

## Redefining Priorities and Minimizing Risk

In addition to seriously evaluating its processes and procedures for aircraft safety, the series of accidents prompted DOE to also reexamine its aviation operations from the perspective of risks versus benefits. In a number of cases, the benefits of the activity did not outweigh the risk, and changes were made.

DOE's use of helicopters is a prime example of a program where the benefits no longer exceeded the risks at most DOE sites. At that time, several sites used helicopters for transporting Special Response Teams (similar to SWAT teams) in response to threats to special nuclear material (SNM) and for aerial observation and tracking. A 1992 Office of Oversight study concluded that the use of helicopters was no longer necessary or appropriate at most facilities. The

ongoing consolidation of SNM had reduced the number of locations where SNM was used and stored. This made it not only feasible, but also more cost-effective, to station security personnel on the ground to protect the material. The number of facilities using helicopters for security missions decreased from four to one by 1995.

Similar reductions occurred in other areas as DOE reexamined aviation missions, downsized major programs, and increased use of charters. As a result, the number of aircraft owned or leased by DOE has steadily declined since the early 1990s.

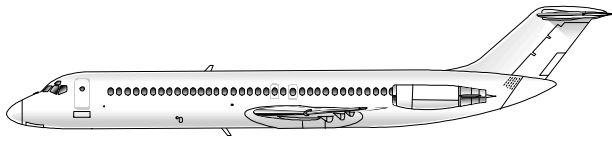
## Current DOE Aviation Program

Even after downsizing over the past five years, DOE's fleet of 31 aircraft is comparable in size to an average U.S. regional airline. The DOE fleet includes a variety of types and sizes of aircraft:

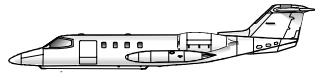
- Three DC-9s, capable of carrying 80 passengers
- 10 other fixed-wing aircraft
- 18 helicopters.

Figure 1 shows the types of aircraft owned by DOE, with DOE's Albuquerque Operations Office (AL) having the most extensive aviation program, including 8 of DOE's 13 fixed-wing aircraft and all three DC-9s. At AL's direction, Ross Aviation operates AL's aircraft, with flights involving passenger and cargo transport throughout the U.S.

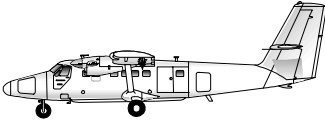
Table 2 provides an overview of the DOE field offices with significant aviation programs. It also shows the contractors that operate DOE-owned aircraft and field offices that use charters.



**DC-9**  
**3 Aircraft in Albuquerque**



**Lear-35**  
**1 Aircraft in Albuquerque**



**deHavilland DHC-6**  
**2 Aircraft in Albuquerque**



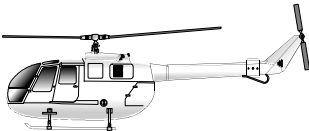
**Beechcraft King Air BE-200**  
**1 Albuquerque, 2 Nevada, 2 Bonneville Power**



**deHavilland DHC-7**  
**1 Albuquerque**



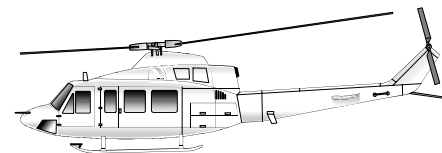
**Cessna Citation II**  
**1 Nevada**



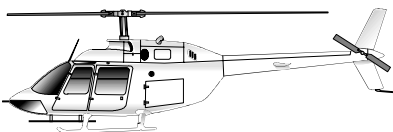
**BO-105**  
**2 Nevada, 2 Andrews Air Force Base**



**BK-117**  
**2 Savannah River**



**Bell-412 (2 owned by EH)**  
**Assigned to Nevada and Western Area Power**



**Bell-206**  
**6 Bonneville Power, 4 Western Area Power**

**Total: 31 Aircraft**

**Figure 1. Department of Energy Owned Aircraft (not to scale)**

**Table 2. Overview of DOE Aviation Programs by Field Office**

<b>Field Office</b>	<b>Aircraft</b>	<b>Missions</b>	<b>Contractor</b>
<b>Operations Offices and Project Offices</b>			
<b>Albuquerque</b>	<b>3 DC-9</b> 1 Lear 35 2 deHavilland DHC-6 1 deHavilland DHC-7 1 Beech King Air	<b>Passenger/cargo transport</b> Research and development	<b>Ross Aviation, Inc.</b>
<b>Nevada</b>	<b>2 Beechcraft King Air</b> 1 Cessna Citation 4 BO-105 1 Bell 412*	<b>Aerial monitoring</b> Nuclear Emergency Search Team (NEST) Security (mission currently not performed) Research and development Emergency evacuation	<b>Bechtel Nevada, Inc.</b>
<b>Savannah River</b>	<b>2 BK-117</b>	<b>Security/night vision devices</b> Environmental surveys Fire surveillance Photography	<b>Wackenhut Services, Inc.</b>
<b>Oakland</b>	<b>Charter</b>	<b>NEST passenger transport</b> Research and development Emergency Evacuation	
<b>Strategic Petroleum Reserve</b>	<b>Charter</b>	<b>Pipeline/power line patrol</b> Passenger/cargo transport Long line helicopter load Agriculture surveys Photography	
<b>Oak Ridge</b>	<b>Charter</b>	<b>Passenger/cargo transport</b> Site surveys Photography	
<b>Richland</b>	<b>Charter</b>	<b>Research and development</b>	
<b>Idaho</b>	<b>Charter</b>	<b>Site support</b> Fire fighting Photography	
<b>Chicago</b>	<b>Charter</b>	<b>Passenger transport</b> Aerial observation Wildlife surveys	
<b>Yucca Mountain</b>	<b>No current flying operations</b>		
<b>Power Administrations</b>			
<b>Alaska</b>	<b>Charter</b>	<b>Passenger/cargo transport</b>	
<b>Bonneville</b>	<b>2 Beechcraft King Air</b> 6 Bell-206	<b>Power line patrol</b> Passenger/cargo transport Agriculture surveys Long line/sling helicopter load Aerial Photography	
<b>Southeastern</b>	<b>No current flying operations</b>		
<b>Southwestern</b>	<b>Charter</b>	<b>Power line patrol</b> Passenger/cargo transport Agriculture surveys Long line/sling helicopter load	
<b>Western</b>	<b>4 Bell 206**</b> 1 Bell 412*	<b>Power line patrol</b> Passenger/cargo transport Agriculture surveys Long line/sling helicopter load	
<p>* Bell 412 helicopters owned by EH-53</p> <p>** One Bell 206 was destroyed in the recent accident.</p>			



# Headquarters Management of the Aviation Program

## Background

In 1993 DOE established a centralized aviation management structure to develop requirements and ensure effectiveness of field operations. EH was assigned responsibility for developing policies, providing technical support to the field, and reviewing and approving field office aviation implementation plans. DOE also instituted annual assessments to oversee DOE aviation programs and established an Aviation Management Board, consisting primarily of Headquarters personnel, to recommend and review broad elements of aviation policy.

While the Headquarters aviation program has retained the same basic structure and functions, it has evolved in the past four years as a result of a concerted effort by aviation program management and aviation safety professionals at Headquarters and in the field. Most notably, annual assessments were discontinued, the Senior Aviation Management Official (SAMO) was directed to report to the Secretary of Energy on aviation safety matters, the Aviation Operations Team (AOT) was established, and the Aviation Management Board was replaced with an Aviation Board of Directors composed primarily of aviation managers from the field.

Figure 2 shows the aviation management roles and responsibilities for DOE Headquarters and field organizations. Figure 3 shows the current management structure of DOE's aviation program.

## Assessment

The Headquarters management structure for aviation differs significantly from the approach used by other DOE programs. In general, DOE program offices review and approve safety documentation for their respective sites, while EH develops policy and provides technical assistance when requested. In contrast, the centralized aviation safety management

**Secretary of Energy:** Appoint an Aviation Board of Directors and a Senior Aviation Management Official.

**Assistant Secretary for Environment, Safety and Health:** Develop DOE aviation policy (EH-5) and conduct the independent oversight program (EH-2), which includes oversight of aviation safety.

**Cognizant Secretarial Officers/Program Offices/Heads of Field Organizations:**

- Develop and implement effective aviation operational, airworthiness, and safety programs.
- Ensure the effectiveness of contractor aviation operational, airworthiness, and safety programs.

**Senior Aviation Management Official:** For aviation-related matters:

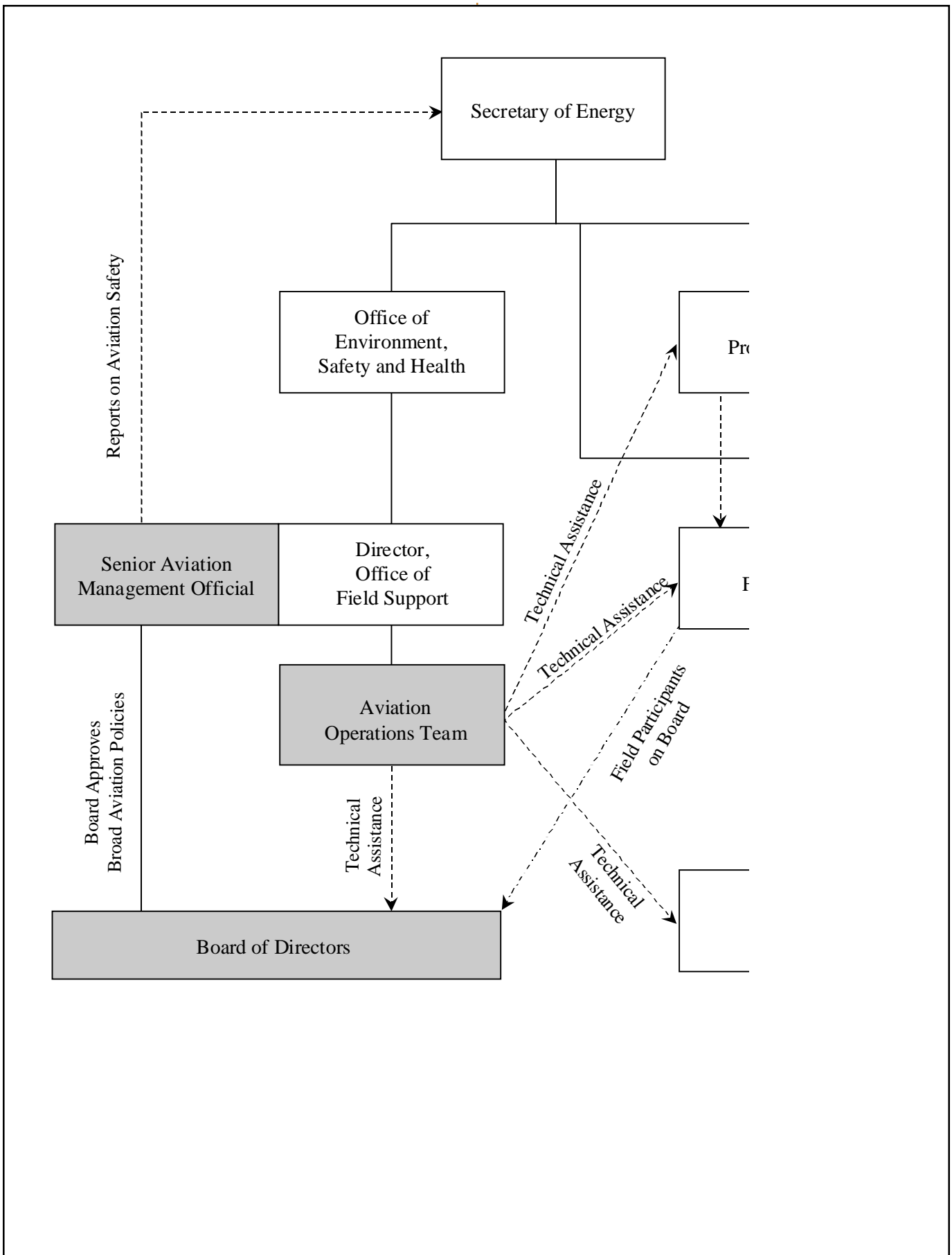
- Provide technical assistance and guidance.
- Provide DOE focal point for collecting, retaining, evaluating, and disseminating aviation information.
- Represent the Department to other government agencies.
- Approve DOE aviation implementation plans.

**Aviation Board of Directors:** Approve broad policy and procedures for the procurement, operations, safety, and disposal of DOE aircraft and aviation services.

**Director, EH-53/Aviation Operations Team:** Provide support to the Aviation Board of Directors and provide broad, aviation-relevant guidance and technical assistance to the DOE aviation community. For example:

- Review draft aviation implementation plans for technical adequacy.
- Develop DOE aviation policy.
- Provide technical assistance to the DOE aviation community when requested.
- Gather aviation information from civil and government sources and distribute it to the field.
- Maintain DOE's aviation accident and incident reporting system.
- Interface with the non-DOE aviation community.
- Manage aircraft inventory in accordance with 41 CFR 101-37.

**Figure 2. Aviation Management Roles and Responsibilities**



structure within EH (which includes the SAMO and AOT) reviews and approves implementation plans as well as developing policy and providing technical assistance.

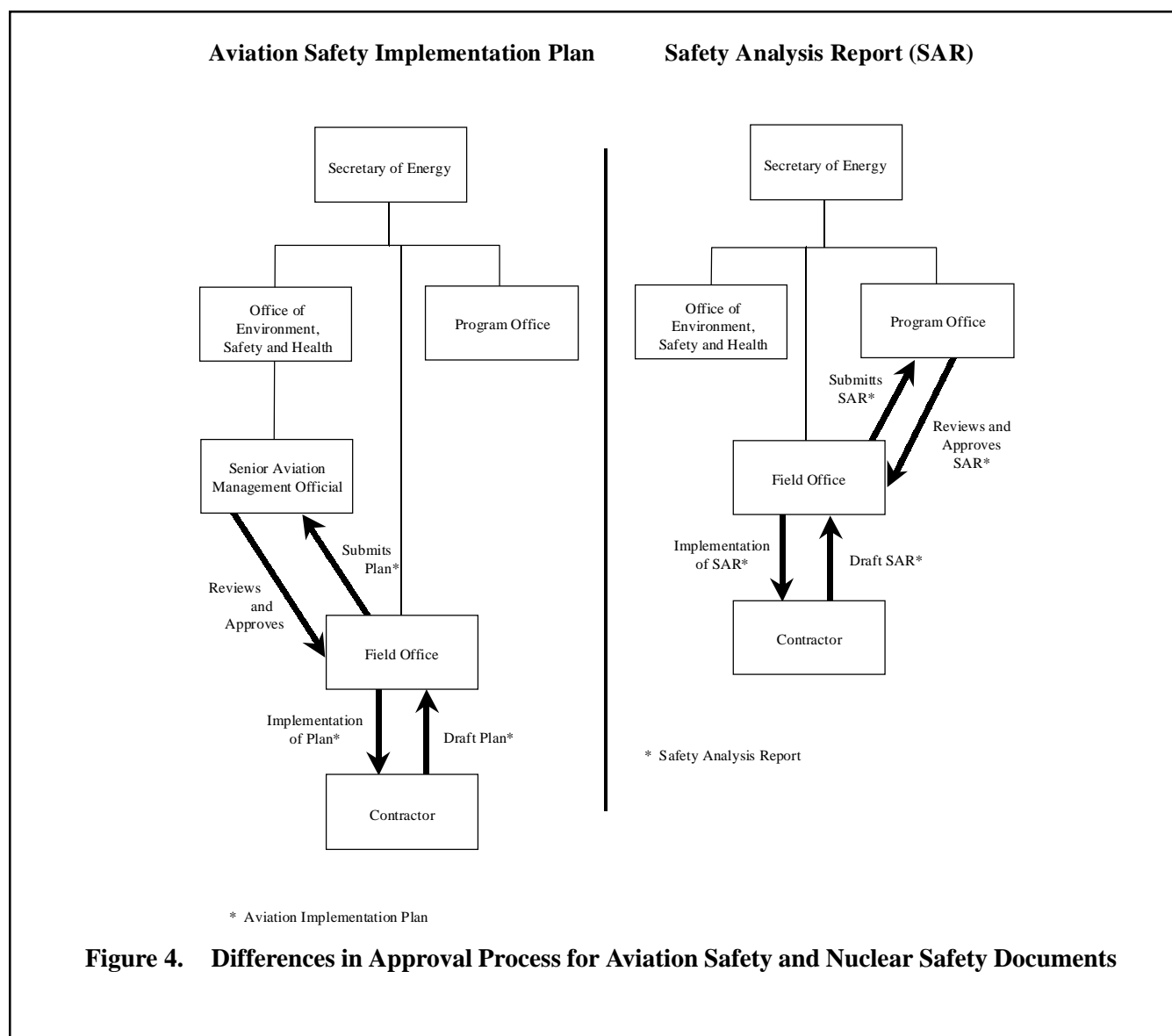
Specific differences between the management structure of the aviation safety program and other aspects of DOE's safety management program (see Figure 4) are:

- The SAMO has responsibilities and authorities, such as approving implementation plans and reviewing safety documentation, that are normally performed by program offices.
- All DOE Headquarters aviation safety technical staff are located within EH. In other safety-related areas (e.g., nuclear safety, radiation protection,

and occupational safety), the program offices have resident staff providing technical advice and review of safety documentation, such as safety analysis reports for nuclear facilities.

While significantly different from other DOE safety management programs, the centralized aviation program management structure is conceptually sound and has several positive attributes:

- **Optimizes use of aviation specialists:** Because it is not cost-effective for each program office to have its own aviation safety specialist, centralization enables DOE to maximize a limited number of aviation specialists and provide support to all program offices.



- **Ensures consistent reviews:** Having a centralized staff review implementation plans and safety documentation results in uniform reviews and helps achieve consistency across DOE sites.
- **The Aviation Board of Directors brings important field perspectives:** Field participation helps to ensure that Headquarters policies reflect field experience.
- **Strong technical resources available to the field:** The field perceives the AOT as a provider of valuable technical assistance. Their assistance in reviewing potential charter operators, providing general and specific aviation safety information, helping sites develop aviation implementation plans, and interfacing with the FAA benefits the field and brings continuity to the program.

Although conceptually sound, the Headquarters aviation safety management systems do not currently operate in accordance with DOE's guiding principles of safety management. Specifically, the Headquarters program offices are not sufficiently involved in the aviation safety program to effectively implement their line management responsibilities. The program offices and SAMO/AOT are not adequately coordinating their efforts, and program offices are not involved in funding decisions and direction to the field for aviation safety issues (see the discussion under "Issue Requiring Management Attention").

While increased program office participation is needed, the program offices should *not* duplicate functions performed by the field or by the SAMO/AOT or add aviation safety specialists to their staff. This would negate the benefits of the centralized management structure.

Instead, program offices need to work in a partnership with the SAMO. In this partnership, the program offices would implement their responsibilities for aviation safety by:

- Providing direction to the field elements
- Setting priorities and goals
- Ensuring that adequate assessments of contractors are performed
- Motivating contractors to perform effective self-assessments
- Actively participating in reviewing plans and safety documentation.

In performing these responsibilities, the program offices and the field should use the AOT as a technical resource when problems or questions arise. Similarly, when the SAMO and AOT perform tasks such as the detailed technical reviews of implementation plans, the review should be a coordinated effort with the program office. Currently, there is little coordination, and the quality and cost-effectiveness of each organization's work is diminished. With a cooperative partnership, the SAMO and the program offices can readily achieve a degree of success that neither could achieve alone.

An example of how collaboration would improve the process is in responding to the implementation guide for the new aviation order. The guide provides excellent instructions for implementing an effective field aviation safety program, but field elements are not required to implement this non-mandatory guidance. Because the guidance is so global, many of its elements do not directly apply to every site. The program offices, with technical support from SAMO/AOT, could evaluate and tailor the guidance so that it is suitable for their sites and issue authoritative direction.

Collaboration has worked very well for a number of other DOE programs, such as decontamination and decommissioning work, where the projects vary dramatically and blanket requirements are impossible to impose. In cases like this, enhanced partnerships have been an important link to safe and cost-effective operations.

EH and program offices are currently launching initiatives to form better partnerships in a number of safety-related areas. For aviation, such a partnership could be an important step toward the "corporate" model envisioned in various DOE strategies, such as the internal safety management approach developed in conjunction with the Task Force on External Regulation.

## Issue Requiring Management Attention

One issue requiring management attention was identified with respect to Headquarters management of the aviation safety program.

**As implemented, the aviation safety management systems at DOE Headquarters are not effectively coordinated.** Although there are some positive attributes to the centralized approach used for



aviation safety, there are also concerns about how the program offices and SAMO are implementing their respective roles.

Line management responsibility flows from the Secretary of Energy to the Headquarters program offices and then to the managers of the DOE field offices and to their contractors. Concurrently, the DOE order assigns program offices responsibility for developing and implementing effective aviation safety programs. In recent years, most program offices have had minimal involvement in reviews of implementation plans, resource allocations, and program direction to operations offices and contractors. Additionally, they do not have the expertise or current information needed to fully evaluate the impact of funding decreases on the viability of aviation operations. Some cost-cutting decisions (e.g., the reduction in training budgets) may not have been effectively evaluated to ensure the continuation of safe and effective aviation operations.

One of the results of the ineffective coordination at Headquarters is that the roles of the SAMO and program office line management are still confusing to the field. Some field personnel still incorrectly view the SAMO and AOT as having line management as well as policy and technical assistance responsibilities. Part of this confusion results from the SAMO owning and directing the use of the two Bell-412 helicopters assigned to Nevada and Western, approving Aviation Implementation Plans, and chairing the Aviation Board of Directors. Because the AOT acts on behalf of the SAMO, they are often viewed as having the same authorities, even though their only role is technical assistance. As a result, the field has sometimes incorrectly assumed that the SAMO is in a line management role, which is compounded by the program offices' tendency to be uninvolved in aviation safety issues.

The confusion over the SAMO and AOT roles contributed to a situation where DOE helicopter operations were not covered by implementation plans. EH-53 owns two Bell-412 helicopters, which they obtained after the Idaho National Engineering and Environmental Laboratory (INEEL) stopped flying them in support of the INEEL security mission. EH-53, as DOE aviation property manager, solicited

proposals from other DOE organizations for use of the Bell-412 helicopters. Nevada responded with a proposal for both helicopters, and Western responded with a proposal for one. After reviewing each organization's proposal and presentation, EH-53 assigned one helicopter to each organization on a trial basis for a year. Permanent assignment of the helicopters was contingent upon each organization demonstrating the utility, safety, cost savings, and mission enhancement achieved during the trial year. However, after assigning the helicopters to Nevada and Western, EH-53 did not develop the policies and procedures under which they could operate these helicopters, nor did the sites specifically incorporate these helicopters into their implementation plans. DOE Order 440.2 requires any organization utilizing aviation operations to submit an implementation plan. No new plan was developed by EH-53, nor were any implementation plan changes submitted by Nevada or Western for the Bell-412s. Consequently, Nevada and Western have been operating Bell-412 helicopters without an approved implementation plan since July 1996. In the past few months, EH-53 has begun development of procedures and policies for Nevada and Western to follow (e.g., pilot qualifications, training requirements).

Although generally viewed favorably, there are indications that the SAMO/AOT does not adequately coordinate safety recommendations with program offices. For example, field personnel cited instances where the SAMO/AOT provided direction without allocating resources and imposed requirements that were not viewed as cost effective or necessary by the field. Conversely, AOT personnel indicated that there were instances where they had identified safety enhancements for the field that were not funded by the program office.

The SAMO/AOT is not and should not be in a position to determine funding priorities or provide direction to the field that affects their funding allocation, since these are line management functions. However, as previously discussed, there are excellent opportunities for the program offices and SAMO to develop a coordinated approach and a cooperative partnership that would address such concerns.

## Background

In keeping with DOE's move toward performance-based requirements, DOE Order 5480.13A was replaced by DOE Order 440.2, Aviation, in September 1995. This order was less restrictive, defined performance-based requirements, and eliminated about 12 pages of prescriptive measures in favor of the five broad requirements shown in Figure 5. In conjunction with DOE Order 440.2, DOE developed an implementation guide, "Implementation Guide for Use with DOE Order 440.2," that provides guidance for establishing and conducting a safe and effective aviation program. The goal was to ensure that facilities maintained the desired level of safety while allowing field elements the flexibility to implement aviation management systems appropriate to site-specific conditions.

Though streamlined, the new order does not eliminate any regulatory requirements. As shown in Figure 5, DOE orders specify that DOE aircraft (including charters and leases) must be operated in accordance with applicable Federal Aviation Administration requirements. Specifically, aircraft that transport passengers or cargo are subject to the requirements of 14 CFR Part 121 or Part 135, depending on the size of the aircraft. Part 121 and Part 135 requirements are briefly outlined in Figure 6. Other applicable FAA regulations that apply to DOE aviation operations include:

- Part 91, General Operating and Flight Rules
- Part 119, Certification: Air Carriers and Commercial Operators
- Part 133, Rotocraft External-Load Operations
- Part 137, Agricultural Aircraft Operations
- Part 145, Repair Stations.

- Aircraft in service to DOE (including both DOE-owned and chartered or leased aircraft) must be operated in accordance with the applicable sections of Title 14 CFR or equivalent international or military standards.
- DOE organizations with aviation programs must submit aviation implementation plans to the DOE's Senior Aviation Management Official for approval.
- DOE organizations conducting unmanned aircraft operations not covered by Public Law 103-411 must establish their own policies and procedures to ensure the safety of their operations.
- DOE organizations must develop aviation safety documentation for each mission that has risks not normally accepted by the public (e.g., security response, research and development).
- Aircraft charter and lease operations must be evaluated by the appropriate DOE organization<sup>1</sup> before they begin flight operations for DOE.

<sup>1</sup> This organization is not specifically identified in program policy, contributing to confusion in roles, responsibilities, and authorities.

**Figure 5. Requirements of the DOE Aviation Program**

Public Law 103-411, enacted in October 1994, requires government agencies that transport passengers or cargo for reimbursement to obtain an appropriate FAA certificate. As a result, government agencies with

Applicable FAA Regulation	General FAA Approval and Inspection Requirements
Part 121:	<ul style="list-style-type: none"> <li>• FAA-approved professional management organization</li> <li>• FAA-approved operations, maintenance, training, and procedures manuals</li> <li>• FAA-approved dispatch program</li> <li>• Records and manuals reviewed and approved initially by FAA and inspected at least annually thereafter (more often if needed)</li> <li>• Annual ramp and enroute inspections conducted on each pilot-in-command and each type of aircraft</li> <li>• Semiannual maintenance observations for each type of aircraft</li> </ul>
Part 135:	<ul style="list-style-type: none"> <li>• FAA-approved professional management organization</li> <li>• FAA-approved operations, maintenance, training, and procedures manuals</li> <li>• Records and manuals reviewed and approved initially by FAA and inspected at least annually thereafter (more often if needed)</li> <li>• Annual ramp and enroute inspections conducted on each pilot-in-command and each type of aircraft</li> <li>• Semiannual maintenance observations for each type of aircraft</li> </ul>

**Figure 6. Part 121 and Part 135 Approval and Inspection Requirements**

aviation missions involving transport of passengers and cargo for reimbursement are subject to the same requirements as commercial carriers.

### Assessment

DOE Order 440.2 requires field offices to develop and submit aviation implementation plans for review and approval by DOE Headquarters. These implementation plans identify appropriate site-specific policies and procedures for missions and their associated risks. Specific details about how to implement an effective aviation program are contained in the Implementation Guide for DOE Order 440.2. Additionally, DOE Order 440.2 requires compliance with applicable FAA regulations.

Evaluation results indicate that field offices are developing appropriate implementation plans and that DOE Headquarters is reviewing them. DOE field offices are ensuring that DOE and applicable FAA requirements are specified in contracts for charter services. Although most sites were late in submitting their implementation plans and there have been and continue to be significant delays in obtaining approvals, most DOE sites have implementation plans that have been approved by the SAMO. Discussions with members of the AOT indicate that safety issues are not holding up approval of the implementation plans; however, an approved implementation plan is an

essential element of DOE’s standard order approach. Therefore, it is critical that sites have approved plans to operate on a site-specific basis.

Overall, DOE order requirements are conceptually sound, and the processes for translating general requirements to site-specific plans and procedures are effectively implemented. Those DOE sites that are required to obtain FAA certificates have done so and in the process have had their aviation operations manuals, maintenance manuals, and training programs approved by the FAA. The FAA regularly inspects at these sites to determine compliance with FAA requirements. In general, DOE sites have performed well on FAA inspections, with few significant findings.

### Issues Requiring Management Attention

Although performance with respect to requirements and regulation is generally adequate, two issues require further attention. First, there continues to be a common misperception throughout DOE that all aviation activities are subject to FAA regulation and inspections. A second issue is that one DOE site, the Bonneville Power Administration, is not subject to the same DOE oversight requirements as other DOE sites, and there are no effective provisions for DOE Headquarters to verify that specific missions

flown by Bonneville Power Administration are conducted safely.

**Throughout DOE, there is a common misperception that, for sites that have a Part 121 or Part 135 certificate, all aviation activities are subject to FAA regulation and inspection and the FAA assures that the operations are safe.** In actuality, the FAA inspects certificate holders only against the requirements of Part 121 and/or Part 135 (i.e., passenger and cargo operations), which includes less than half of DOE's missions. Even if the site is in compliance with Part 121 or Part 135, other DOE aviation activities (such as security response, aerial surveys/mapping, NEST, and pipeline and electric power line patrols) are not normally inspected by the FAA. In addition, some DOE charters (e.g., pipeline patrol and photography) regulated by 14 CFR Part 91 are only required annual airworthiness inspections and pilot evaluations by FAA-licensed personnel. Table 3 summarizes DOE field office missions, showing which activities are subject to FAA inspection.

These misperceptions have two negative impacts :

- **Confusion about the scope of the FAA's responsibility for regulating DOE aircraft can result in incomplete DOE reviews and line management assessments of aviation operations.** In some cases, DOE aviation safety personnel do not perform adequate assessments of aviation programs because of their mistaken belief that FAA inspections are comprehensive, when in fact they are not designed to cover many of DOE's aviation activities. To ensure full coverage, DOE aviation safety personnel need to be aware of what FAA regulation and inspections are designed to do, and to understand their limitations. DOE personnel should then focus on designing complementary review and assessment activities.
- **Some DOE personnel are not clear about the distinction between responsibility for regulation/inspection and responsibility for safety.** A significant number of DOE and contractor personnel indicated that the FAA is responsible for ensuring that DOE aviation operations are safe. This perception is incorrect. The FAA considers certificate holders responsible for aviation safety and expects them to establish acceptable levels of safety by complying with FAA

regulations. Further, regardless of what organization has regulatory responsibility, it is a fundamental principle of DOE's safety management program that DOE and DOE contractor line management are legally, morally, and ethically responsible for ensuring that their aviation operations are conducted safely. DOE remains fully accountable for all aviation accidents and any damage, injuries, deaths, or environmental impacts resulting from its aviation operations (including DOE-owned and chartered or leased aircraft).

**Appropriateness of provisions of Bonneville Power Administration's exemption from DOE aviation safety requirements and oversight.** Because it was designated a Reinvention Laboratory under the Vice President's National Performance Review, Bonneville was granted a broad exemption from DOE aviation safety orders and DOE oversight under the provisions of a letter signed by the former Secretary of Energy in July 1994 and DOE Order 440.2. The Secretarial letter requires Bonneville to obtain a Part 135 certificate and indicates that Bonneville will be subject to FAA operational and safety inspections and sanctions for any non-compliance. There are no provisions for a periodic review of the basis for, and appropriateness of, the exemption as circumstances change.

Bonneville has obtained an FAA Part 135 certificate that covers all Bonneville-owned aircraft. Consequently, the FAA periodically inspects Bonneville operations against Part 135 requirements, including all pilots and aircraft. Additionally, Bonneville has obtained a Part 133 certificate for helicopter external load operations and a Part 137 certificate for agricultural aircraft operations. However, as with other DOE sites, some missions (e.g., power line patrol) are not normally inspected by the FAA. Additionally, since Bonneville is exempt from DOE orders, they are not required to develop aviation safety documentation relating to missions with risks not normally accepted by the public.

DOE's only insight into the effectiveness of Bonneville's aviation operations comes from results of FAA inspections. Although the FAA reported that Bonneville is generally in compliance, FAA inspections do not cover all operations. Additionally, there has been little or no interaction between Bonneville Power Administration and the DOE Headquarters aviation

**Table 3. Summary of Federal Aviation Administration (FAA) Regulation of DOE Aviation Missions**

Field Office	Missions	Inspected by FAA?	Certification Under 14CFR
<b>Operations Offices and Project Offices</b>			
<b>Albuquerque</b>	<b>Passenger/cargo transport</b>	<b>Yes</b>	<b>Parts 121 and 135</b>
	Research and development	No	
<b>Nevada</b>	<b>Aerial monitoring</b>	<b>No</b>	<b>Operations office does not intend to have contractor apply for a Part 135 certificate</b>
	Nuclear Emergency Search Team (NEST)	No	
	Security (mission currently not performed)	No	
	Research and development	No	
	Emergency evacuation	No	
<b>Savannah River</b>	<b>Security/night vision devices</b>	<b>No</b>	<b>Contractor has been awarded a Part 135 Certificate</b>
	Environmental surveys	No	
	Fire surveillance	No	
	Photography	No	
<b>Oakland</b>	<b>NEST passenger transport</b>	<b>Yes</b>	<b>If charter company has Part 135 Certificate</b>
	Research and development	No	
	Emergency evacuation	No	
<b>Strategic Petroleum Reserve</b>	<b>Pipeline/ power line patrol</b>	<b>No</b>	
	Passenger/cargo transport	Yes	If charter company has Part 135 Certificate
	Long line helicopter load	No	
	Agriculture surveys	No	
	Photography	No	
<b>Oak Ridge</b>	<b>Passenger/cargo transport</b>	<b>Yes</b>	<b>If charter company has Part 135 Certificate</b>
	Site surveys	No	
	Photography	No	
<b>Richland</b>	<b>Research and development</b>	<b>No</b>	
<b>Idaho</b>	<b>Site support</b>	<b>No</b>	<b>Plan to SAMO to resume aviation operations</b>
	Fire fighting	No	
	Photography	No	
<b>Chicago</b>	<b>Passenger transport</b>	<b>Yes</b>	<b>If charter company has Part 135 Certificate</b>
	Aerial observation	No	
	Wildlife surveys	No	
<b>Yucca Mountain</b>	<b>No current flying operations</b>		
<b>Power Administrations</b>			
<b>Alaska</b>	<b>Passenger/cargo transport</b>	<b>Yes</b>	<b>If charter company has Part 135 Certificate</b>
<b>Bonneville</b>	<b>Power line patrol</b>	<b>No</b>	
	Passenger/cargo transport	Yes	Part 135
	Agriculture surveys	Yes	Part 137
	Long line/sling helicopter load	Yes	Part 133
<b>Southeastern</b>	<b>No current flying operations</b>		
<b>Southwestern</b>	<b>Power line patrol</b>	<b>No</b>	
	Passenger/cargo transport	Yes	If charter company has Part 135 Certificate
	Agriculture surveys	No	
	Long line/sling helicopter load	No	
<b>Western</b>	<b>Power line patrol</b>	<b>No</b>	
	Passenger/cargo transport	No*	Applying for Part 135 certificate
	Agriculture surveys	No	
	Long line/sling helicopter load	No	
<p>* Public Law 103-411 requires government organizations flying passengers or cargo for reimbursement to obtain an appropriate certificate. Western has flown no passenger/cargo missions for reimbursement, so they are not required to have a Part 135 certificate. Western is applying for a Part 135 certificate to implement FAA standards and inspections.</p>			

safety program management since the exemption was granted. Bonneville Power Administration is not required to submit an aviation implementation plan for SAMO approval and does not participate in the Aviation Board of Directors. Bonneville aviation safety relies on line management (i.e., Bonneville and its contractors) to implement requirements and perform

self-assessments effectively; Bonneville does not receive the potential benefits of DOE Headquarters technical review of procedures or DOE's independent oversight function.

Potential actions to address these two issues are discussed in Section 6.



## Background

Aviation operations, under the best of conditions, involve an inherent level of risk. DOE's operations cannot always be conducted in optimal conditions and involve hazards not typically associated with passenger and cargo transportation. Long flights at low altitudes close to power lines and towers, unfamiliar terrain, night flights, transportation of potentially dangerous materials, and rapid deployment of security forces into hostile conditions are common to DOE's aviation program.

## Assessment

**The results of this Oversight evaluation indicate that the DOE aviation program is generally being implemented effectively, but there are some emerging concerns and areas that require additional attention.**

In general, policy, standards, requirements, and guidance are adequate to implement an effective and safe aviation program. The reviews of seven field aviation programs indicate that DOE sites are operating and maintaining aviation documentation in compliance with applicable FAA and DOE requirements.

Generally, the pilots who fly and the personnel who maintain DOE aircraft have appropriate qualifications and extensive experience, and they demonstrate a high level of professionalism. In fact, most organizations require pilot and maintenance personnel qualifications and aircraft worthiness that meet or exceed 14 CFR Part 135 requirements. The organizations maintain comprehensive records, readily accessible for review, of aircraft maintenance actions and personnel qualifications, experience, and training.

Although qualifications of pilots are generally a strength across DOE, the recent accident at Western

demonstrates that management must rigorously enforce its qualification requirements and not allow unqualified individuals to fly aircraft as a matter of convenience. In the recent Western accident, the pilot flying the helicopter was not fully qualified and did not have the appropriate experience or training. Western management allowed this pilot to fly when their primary pilots were unavailable. This instance demonstrates that the use of unqualified individuals can nullify the effectiveness of the stringent pilot qualification requirements.

There are also some indications that the visibility of and attention to aviation safety are slipping. In the field, the qualifications of some DOE aviation management personnel who provide direction to the contractors are a concern. Specifically, a number of qualified DOE aviation management personnel who have retired recently have been replaced by people with appropriate management skills but little aviation knowledge, experience, or training. Training for field Aviation Managers and Aviation Safety Officers has often been deferred. Additionally, there are no qualification or training standards to identify the qualifications and expectations of field aviation management. This is exacerbated by a general downsizing of aviation operations; aviation management is assigned as a collateral duty, managers have less time available for aviation matters, and aviation management positions generally report to a lower level of the organization. Therefore, a situation is developing where less-qualified people have less time available to properly manage aviation programs and have less organizational influence to ensure an effective program. This is occurring simultaneously with DOE's move to performance-based orders which do not specify detailed requirements. DOE's safety management approach relies on the effectiveness of the processes for reviewing and approving implementation plans and other site analyses and



**Passenger and cargo transport:** DOE carries passengers and classified and unclassified cargo for DOE and other agencies for reimbursement. Ross Aviation, Inc. under contract to the Albuquerque Operations Office, carries most of DOE's cargo and passengers; these have included artifacts for the Smithsonian Institution, prisoners for the Department of Justice, and passengers and cargo requiring quick and secure delivery for the nuclear weapons program. Other field offices and contractors also carry passengers and cargo. Some unique types of cargo transported by DOE aircraft include highly radioactive short-lived isotopes for use in medical experiments, non-nuclear components of nuclear weapons, and a variety of hazardous materials. Every passenger flight must satisfy Circular A126 requirements for cost effectiveness.

**Responding to radiological emergencies:** Nevada has a fleet of aircraft that can carry several types of sensors for aerial searches of nuclear material. These same sensors are used to conduct radiological, magnetic, and thermal surveys of DOE sites that characterize and record site emissions for historical purposes and site improvement planning. These missions support the Nuclear Emergency Search Team and the Aerial Measurement Group. One aircraft is on alert at all times.

**Aerial surveillance:** Because most DOE sites cover large geographic areas, it is often cost effective to conduct aerial surveillance to perform such activities as wildlife surveys, photography, forestry surveys, fire watches, and operational observations by aircraft.

**Security operations:** One site, Savannah River, continues to use helicopters to provide a security response capability. Savannah River has determined that, given the many security interests spread over a large geographic areas, it is cost effective to fly the special response team to the location of a threat from a central location. Savannah River maintains one helicopter on alert at all times to transport special response teams and observe/track adversaries.

**Patrolling electric power lines and pipelines:** DOE's power administrations are responsible for delivering electrical power over tens of thousands of miles of power lines. To provide effective delivery and reestablish service during an outage, aircraft are used to identify potential problems through routine patrols of the lines, quickly identify breaks and transport repair crews during outages, and transport equipment and personnel during system upgrades. The Strategic Petroleum Reserve has a similar mission with its oil pipelines.

**Emergency response:** Although not part of normal DOE aviation duties, DOE aircraft and crews are prepared to respond to emergency situations such as emergency evacuations or transportation when there is no other alternative. On occasion, DOE's aircraft have been used for such purposes at the request of local government agencies to respond to emergencies.

**Research and development:** DOE has a limited airborne research and development program, involving remotely piloted aircraft as well as manned aircraft. Research and development packages are designed to be easily mounted on and dismounted from aircraft so that an aircraft can support more than one research program and provide cost effective research and development platforms to DOE and other agencies.

procedures, which in turn rely on the competence of personnel who develop, review, and approve plans and procedures.

These trends are partially mitigated by the increasing FAA role in performing inspections at some sites, the support available from the AOT (see Section 3), and the fact that most contractor organizations have well qualified personnel. However, some concerns still exist. The Strategic Petroleum Reserve lacks qualified personnel at both the DOE field office and the contractor, and the AOT has significantly reduced the number of technical assistance visits to field locations (citing reduced travel budgets).

In accordance with downsizing and DOE's cost-cutting efforts, DOE and contractors have appropriately looked for opportunities to reduce the cost of aviation operations. However, it is also important to ensure that cost-cutting measures are applied appropriately and do not degrade safety. At Nevada, the contractor made a decision to eliminate simulator training for pilots. As a compensatory measure, local flying training was increased; however, the compensatory measure does not take the place of simulator training (e.g., emergency operations) and evaluation by qualified flight instructors. Still, the contractor received an award from its parent organization for cost savings associated with eliminating the simulator training. This case indicates that continued vigilance is needed to ensure that cost-cutting efforts do not degrade the margin of safety.

Assessment of performance is another issue that requires attention. Until about two years ago, annual assessments of field aviation programs were performed by Headquarters aviation safety personnel. Appropriately, these annual assessments were discontinued as part of DOE's initiative to reduce redundant DOE Headquarters line management oversight. However, DOE field offices have not been proactive in initiating their own assessment programs. Recently, the field offices have begun to implement programs that assess contractor operations, but these programs are not mature and lack personnel with the experience needed to perform effective assessments. In addition, field office managers are aware that they have requirements to perform self-assessments on a recurring basis, but few have a formal approach for scheduling and performing these functions. In the absence of effective DOE assessments and self-assessments, DOE managers are not receiving the

feedback needed to ensure effective implementation. Such concerns are particularly acute at sites that are not routinely inspected by the FAA.

Although the implementation of aviation safety programs is generally effective, these trends, if not addressed, could degrade DOE's aviation safety program performance.

A number of the trends identified during this Oversight review were evident in the Western accident. Most notably:

- The Western assessment, line management oversight, and lesson-learned programs were not formalized, comprehensive, well understood, or effectively implemented.
- Implementation of documented requirements was inconsistent or not rigorously enforced.
- Responsibilities for aviation safety were not implemented, such as performing assessments, ensuring that policies and procedures are updated and accurate, and maintaining current information necessary for safe operations (e.g., aviation charts were out of date).

- Aviation safety personnel expressed concern that they did not have sufficient time to devote to their aviation safety responsibilities because of the time needed for other duties.

- Western management controls allowed an individual to fly helicopters for operational expediency even though he was not fully qualified.

Taken together, these factors demonstrate an insufficient emphasis on safety. Management must continue to emphasize the priority of safety over schedules or convenience. This attitude must start at top levels of the DOE field office and contractor organization, and thoroughly permeate each organization. Management commitment to safety and a clear understanding of the issues are critical. DOE and contractor personnel responsible for managing aviation safety programs are well aware of the accidents that occurred in the early 1990s and recognize that continued attention is needed to prevent recurrence. However, in light of the identified trends, renewed and increased attention is warranted.

# Conclusions and Opportunities for Improvement

**The overall conclusion of this study is that DOE-wide requirements and the Headquarters safety management program implemented since the 1990-1992 accidents have contributed to safer operations.** However, emerging trends require management attention to keep the program effective. The most significant concern is the training and qualifications of DOE field personnel responsible for managing the aviation program and assessing contractor performance. DOE's performance-based requirements rely on the competence of DOE's aviation safety personnel at Headquarters and the field to ensure safety. The loss of experienced personnel, together with decreased priority for training and reduced Headquarters technical and assessment support, could lead to a degradation of aviation safety programs in the field.

The following opportunities are not prescriptive but may contribute to enhancements in the aviation safety program.

- 1. Headquarters should establish minimum qualification standards for DOE field office personnel responsible for aviation safety management and assessments. DOE field offices should ensure that field personnel meet these standards and ensure that assessments of contractors are comprehensive and emphasize areas not inspected by the FAA.**

While many DOE personnel at field offices are well qualified, a substantial number are relatively new to their positions and have little aviation background. Specific actions may include:

- Establish formal aviation program training and qualification standards.
- Ensure that currently qualified staff retain their proficiencies.

- Ensure that unqualified staff are quickly brought up to a minimal standard.
  - Make training and refresher training a management priority.
  - Reevaluate current assessment programs to ensure that they are effective and are regularly performed by technically competent personnel.
  - Evaluate contractor self-assessment programs to ensure their effectiveness.
  - DOE aviation safety personnel need to be aware of FAA regulations and inspections, and to understand their limitations. DOE personnel should then focus on designing comprehensive review and assessment activities that are complementary to the scope and frequency of FAA inspections.
- 2. Program offices should become more involved with implementing their responsibilities by working in a partnership with the SAMO; in this partnership, the program offices should use the AOT as a technical resource.**

DOE program offices need to implement their responsibilities for safety in a way that capitalizes on the existing, generally effective, centralized program management structure. For example:

- Program offices should reemphasize their responsibility for safety to include aviation safety.
- Program offices need to actively participate in their programs by reviewing and concurring on plans and safety documentation. They should not, however, add specialists to their staff or change

processes that are working effectively (e.g., SAMO review and approval of implementation plans). Rather, program offices should enter into cooperative partnerships with the SAMO/AOT and use the AOT as a technical resource in implementing program office responsibilities and ensuring that cognizant secretarial officers have an accurate understanding of the programs under their purview.

- Program offices should establish procedures to resolve conflicts between aviation safety and operational considerations.
- Program offices should take the lead in establishing a framework for ensuring coordination and mutual agreement on goals and priorities among the program offices, field offices, and the SAMO/AOT.
- Program offices should determine whether lessons learned in the aviation safety program (e.g., review and approval processes for implementation plans) can benefit safety management in other areas (e.g., review of safety analysis reports for nuclear safety).

**3. DOE management at all levels should reemphasize that DOE and DOE contractor line management remain responsible for ensuring safe operations regardless of whether DOE or the FAA has direct inspection responsibility.**

There were indications that DOE and contractor personnel are not clear about the role of the FAA, including a common misperception that the FAA is responsible for aviation safety. DOE Headquarters suggested actions include:

- Clarify the FAA role and ensure full implementation of DOE line management responsibilities.
- For those missions not inspected under FAA certification, DOE must ensure that it effectively identifies and implements aviation safety requirements.
- Emphasize excellence in aviation safety rather than being satisfied with achieving the minimum compliance requirements.

- Establish specific performance measures for DOE and contractor aviation safety personnel (e.g., time spent in the performance of assessments and observing and correcting aviation safety performance).

- Incorporate aviation safety performance measures, including meaningful rewards and sanctions, into contracts and management's annual appraisals.

**4. Senior DOE managers should periodically reevaluate the Bonneville Power Administration exemption and revise as appropriate.**

Since the Bonneville exemption was put in effect, a number of circumstances have changed (e.g., a new DOE senior management team is in place, and DOE orders have been revised to be less prescriptive). However, there are no provisions to ensure that the exemption is still appropriate or that DOE Headquarters has an accurate and current understanding of the status of Bonneville's aviation safety programs. Suggested actions for Headquarters include:

- Reevaluate the appropriateness of the exemption in light of current DOE plans and priorities regarding the future of Bonneville.
- Revise the exemption to include provisions for a periodic reevaluation of the exemption in light of changing circumstances (e.g., changing DOE priorities, revision of DOE orders, changes to the Bonneville aviation program, revision of FAA requirements). The exemption should also require Bonneville to keep DOE Headquarters aviation safety management officials informed of the status of the program.
- Although Bonneville is currently exempt from DOE requirements and oversight, there still may be benefits associated with sharing lessons learned and making use of DOE Headquarters technical resources and expertise.

# ATTACHMENT A

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## RECENT HELICOPTER ACCIDENT

### WESTERN AREA POWER ADMINISTRATION

#### Brief Summary of the Accident

On Wednesday, April 23, 1997, a helicopter belonging to the Western Area Power Administration (Western) crashed near the summit of Raton Pass in southern Colorado. On April 24, 1997, a Type B Accident Investigation Board was appointed to investigate the accident in accordance with DOE Order 225.1, Accident Investigations.

The accident occurred at approximately 4:10 p.m. about one-half mile north of the Colorado-New Mexico border along Interstate Highway 25 (I-25). At the time of the accident, the helicopter was en route from Farmington, NM, to Fort Collins, CO, following completion of a power line patrol mission in northwest New Mexico and northern Arizona. The mission had begun the previous day and was completed on the morning of April 23. The planned route included fuel stops in Las Vegas, NM, and Pueblo, CO. Shortly after 12:00 p.m., the pilot received a weather briefing in Farmington from an Albuquerque Flight Service Station briefer who indicated that the weather along the planned route of flight would be good visual flight rules (VFR) weather except for Raton Pass, where the briefer expected low clouds.

The pilot left Farmington at approximately 1:00 p.m. under a VFR flight plan and landed at Las Vegas, NM, at approximately 3:10 p.m. where he supervised the refueling of his aircraft. He did not attempt to update his weather briefing at Las Vegas, even though he had been previously advised that Raton Pass might be the limiting factor. He departed Las Vegas at approximately 3:30 p.m. enroute to Pueblo, CO, activated his flight plan shortly after takeoff and followed I-25. Between 4:00 and 5:00 p.m., witnesses indicated that the weather at Raton Pass was, at times, thick fog with drizzle. When fog was not present, the ceiling was estimated to be 500 feet above ground level (AGL). The temperature was about 35 degrees Fahrenheit.

As the aircraft approached Raton Pass at an altitude of approximately 300 feet AGL, its airspeed was approximately 80 knots. Just after the aircraft crested

the ridgeline that runs through the Pass, the pilot reported that he encountered a cloud bank that was approximately one mile ahead. Upon seeing the cloud, the pilot executed an immediate hard right climbing turn. During the turn, speed slowed to 20-30 knots and the aircraft abruptly entered an uncommanded right yaw (horizontal rotation) caused by loss of tail rotor effectiveness. As the aircraft spun out of control, it descended and crashed approximately one-quarter mile west of I-25. The aircraft impacted the side of a hill, became airborne while continuing a right turn, hit the ground facing north, and rolled on its right side where it came to rest at an elevation of approximately 7,500 feet above mean sea level. There was no post-crash fire; however, the aircraft was destroyed. The pilot shut down the aircraft and exited through the passenger door, which was above him. After exiting the aircraft, he reported the accident to Western management and made a 911 call to obtain assistance. He then proceeded down the hill to I-25, where he was picked up by a person who had heard the 911 call on a scanner and transported the pilot to a hospital. The pilot was treated for bruises and minor cuts and released from the hospital at 8:00 p.m.

#### Root and Contributing Causes

The Board determined the root cause of the accident was the pilot's lack of experience and training for the terrain and weather encountered at the time of the accident. The pilot had limited experience flying in mountainous terrain. The pilot's primary role at Western was that of Aviation Safety Officer. He had an additional secondary role loosely defined as a "backup pilot." However, Western's Flight Operations Standards Manual does not refer to a backup pilot position (or define any duties or qualifications), and Western management did not ensure that the pilot had the training to effectively fulfill the duties of a line pilot.

In addition, four contributing causes<sup>1</sup> were identified:

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<sup>1</sup> Contributing Causes: Factors that significantly increase the likelihood of the accident without directly causing it.



- Lessons learned from previous aviation accidents involving unqualified, inexperienced, and/or inadequately trained pilots were not sufficiently implemented. Prior accident investigation reports recommended that hiring and training be accomplished in ways that ensure that aviation activities are accomplished safely and according to established policy. The pilot was assigned line pilot responsibilities after being hired by Western, although he was not qualified for these duties.
- Oversight of the aviation program was not applied with sufficient discipline, focus, and consistency. The Board believed that Western aviation officials were ambivalent about their oversight responsibilities. There appeared to be a lack of awareness of Western's pilot-in-command requirements; a disregard for currency requirements; lack of aviation management oversight to ensure that pilots were qualified; and a lack of formal, structured, and consistent training. The oversight function must include in-depth assessments and reviews by internal and external entities.
- Roles, responsibilities, and authorities of aviation program officials were not clearly defined and understood. The Aviation Implementation Plan, Flight Operations Standards Manual, pilot position descriptions, and pilots' statements to the Board did not consistently delineate aviation program roles and responsibilities. There was uncertainty about the role of Chief Pilot, including his responsibility for training. The Aviation Safety

Officer's role in oversight was unclear, and he was unaware of certain program requirements.

- Management has not fostered an atmosphere that demands a high level of accountability in the aviation program. Western aviation personnel have not been held sufficiently accountable for performing roles and responsibilities as defined in program policies and procedures.

## Pilot Experience and Qualifications

The pilot was an experienced naval aviator with a background in pilot standardization, squadron operations, and maintenance management. He had approximately 2,700 hours of flying time in helicopters and 700 in fixed wing aircraft, with numerous low level and combat training missions. He had about 400 hours of flying time in the desert southwest. He left military service in 1988 and was hired by Western as Aviation Safety Officer in May 1994. His position description was amended in October 1994 to include backup pilot duties. The pilot had no flying experience between 1988 and 1994 and little experience in the past three years after being hired by Western. The pilot flew as pilot-in-command prior to and shortly after joining Western, but had not flown power line patrol prior to joining Western. The pilot had accumulated 172 hours of flight at Western, including power line patrol, transporting passengers, ferrying aircraft, maintenance flights, and training flights with other Western pilots. Below is a table summarizing Western's pilot requirements and the qualifications of the pilot involved in the accident.

Western Helicopter Requirements for PIC*	Pilot Qualifications	Western Currency Requirements	Pilot Currencies
3,000 hours in helicopters	2,850 hours in helicopters 700 hours fixed wing	100 hours PIC* aircraft category in previous 12 months	72 hours in previous 12 months - Western had pilot fly with experienced line pilot just prior to beginning power line patrol mission
1,000 hours in make/model	Not reported	Proficiency flight check in previous 12 months	October 1995 date of last proficiency flight check
1,000 hours mountain flying experience	400 hours mountain flying experience in desert southwest - different from Colorado Rocky Mountains		

\* Pilot in command.

### WAPA Pilot Requirements and Qualifications of Pilot Involved in Accident

# ATTACHMENT B

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## CONDUCT OF OVERSIGHT REVIEW

### Review Activities

This report summarizes the results of two series of Headquarters and field reviews conducted by the Department of Energy (DOE) Office of Oversight. The first, performed July to September 1996, focused on Headquarters management and three field aviation programs:

- Albuquerque Operations Office and Ross Aviation, Inc.
- Oakland Operations Office and Lawrence Livermore National Laboratory
- Nevada Operations Office and Bechtel Nevada, Inc.

This results of the first series of reviews were documented in an Oversight report issued in October 1996. The first series of reviews raised a number of issues that prompted Oversight to conduct this followup review.

In 1997, aviation programs at five additional DOE field office and contractor sites were evaluated:

- Oak Ridge Operations Office, Lockheed Martin Energy Services, and Cherokee Air Services
- Western Area Power Administration and Century Helicopter, Inc.
- Savannah River Operations Office and Wackenhut Services, Inc.
- Nevada Operations Office
- Strategic Petroleum Reserve Project, DynMcDermott Petroleum Operations Company, Petroleum Helicopter, Inc., and Transit Aviation, Inc.

Together, these seven sites encompass most of the DOE-owned aircraft and operations.

### Conduct

The evaluations were conducted by interviewing DOE and contractor managers and staff with

responsibility for DOE's aviation program, reviewing aviation program documents, and observing field activities. The evaluation team followed standard DOE Office of Oversight protocols for data gathering, validation, and analysis. Interviews with Headquarters personnel focused on the Senior Aviation Management Official, the Aviation Operations Team, and the program offices that use aviation services.

### Oversight Review Team Composition

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#### Associate Deputy Assistant Secretary:

Neal Goldenberg

#### Director, Office of Security Evaluations:

Barbara R. Stone

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